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SHRINKAGE OF SOFT PORK UNDER COMMERCIAL CONDITIONS.[1]

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During the past 10 years the swine industry of the South has developed very rapidly. With this development has come an increased production of soft and oily pork. Until comparatively recent years it was thought that acorns (or mast) was the principal feed that caused soft or oily meat, but when the southern farmers began growing peanuts in large quantities for feed and harvesting them by hogging them down, there was a rapid increase in the number of southern hogs that yielded soft or oily pork. This kind of pork increased enormously, because peanut-fed hogs made profitable gains and the peanut crop could be thus harvested without material labor cost or waste. The crop diversification that followed the extremely low price for cotton at the beginning of the World War caused the southern farmers to adopt more largely the peanut and hog combination. This was found to be so profitable that peanut

[1] This report is the result of a study undertaken by the Bureau of Markets in 1919 for the purpose of ascertaining the causes for differences in the market prices of firm, soft, and oily hogs. Since this work was begun, special appropriations have been made available to the Bureau of Animal Industry for the study of the soft pork problem, which will make possible a much more comprehensive study of the causes of soft pork and their prevention.

Mention should be made of the valuable assistance rendered by Mr. E. V. Baker at Fort Worth, Tex., and by Mr. E. K. Hess at East St. Louis, Ill., in conducting these tests at the packing plants; also by Mr. Clarence T. Marsh, laboratory inspector in charge, St. Louis, Mo., who made the melting-point and iodine-number determinations.

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acreage and hog production increased rapidly, thus constantly increasing the supply of soft and oily pork.

This kind of pork has not been a satisfactory product from the standpoint of the packer or retailer, and this fact has been one of the most disturbing elements in the southern live-stock markets for several years, because of the price penalties imposed on hogs that are alleged to be soft or oily. The development and importance of the hog industry in the South may be realized by comparing the figures of the Department of Agriculture, which show that about 20,000,000 hogs were on farms in the Southern States January 1, 1921, with the slaughter records of some of the southern packing plants, which show that 30 to 50 per cent of the total number of hogs killed during heavy marketing seasons are soft and oily.

Oily pork differs from firm pork in that it remains soft and flabby when chilled. The fat has a yellowish tinge and a glossy appearance. The pork known as "soft" resembles a blending of the characteristics of both the firm and oily. It is whiter than the oily and not so glossy or flabby. It is also much softer than firm meat. Soft or oily meat is more difficult to handle than firm meat and is unattractive in appearance, especially to those accustomed to white, firm meat.

Packers object to handling hogs which produce such pork except at heavy discounts, claiming that the product is more difficult to sell and that it shrinks more than firm pork.

CAUSES OF SOFT AND OILY PORK.

All of the factors that cause soft and oily pork have probably not been discovered, but most of the scientific investigators who have made careful studies of the problem are unanimous in their opinion that feed is the principal factor. It has been demonstrated by careful experiments that hogs fattened almost exclusively on corn or feed of a similar composition chill firm, while hogs fattened exclusively on peanuts invariably chill soft or oily. The increased numbers of peanut-fattened hogs, together with the objectionable features in their products, resulted in a reduction in their market prices that was alleged to be discriminatory. This created much dissatisfaction among southern swine producers, who protested vigorously against such practices.

Before the hog is slaughtered it is impossible to determine the kind of carcass or meat product it will produce, and many shippers fail to understand how live hogs that to all outward appearances are alike in finish, size, and quality should be so radically different after slaughtering and chilling. Admitting a possible difference in the condition of the flesh caused by feed, they can not believe it should justify a price discrimination varying from 2 to 7 cents a pound live weight from that paid for firm hogs. The situation, especially during

and since the war, became so serious that appeals were made to various branches of the Government, particularly the U. S. Department of Agriculture and the Federal Trade Commission, to determine the justice of the penalizing market practices.[2] In response to this demand the Federal Bureau of Markets began an investigation of the problem early in 1919.

Some of the leading live-stock markets where southern hogs are shipped in large numbers were visited, and the following differences in prices per 100 pounds live weight were found to exist between hogs suspected of being soft or oily and those expected to produce firm carcasses.

Place.	Difference.	Place.	Difference.
Fort Worth, Tex...	$2.	East St. Louis, Ill..	$5 to $7.
Birmingham, Ala..	$3 for oily and $1.50 for soft.	Indianapolis, Ind..	$2.
Richmond, Va.....	$3 for oily and $2 for soft.	Kansas City, Mo...	$4.

In view of the fact that there seemed to be no uniformity in the discounts or methods of applying them at any one market, and that great variations prevailed among the different markets, it was deemed advisable to conduct tests which might assist in determining the reason of the discrimination and, if possible, to determine what differences really existed between the three kinds of pork, especially with reference to the shrinkage and merchandising factors. These two factors, therefore, were given careful study and two series of commercial tests were made to ascertain whether the objections cited were material and serious enough to justify the discounts given. The results of the tests and information obtained are described in this bulletin.

Since this work was completed, the Bureau of Animal Industry of the United States Department of Agriculture, in cooperation with a number of State agricultural experiment stations, has undertaken a comprehensive investigation of the soft-pork problem. This line of research is being conducted to determine primarily the various fundamental causes of soft pork and their relationships, and to develop methods of avoiding or overcoming the soft condition. Related questions, including the shrinkage of pork from hogs of the various degrees of firmness through the packing-house processes are being studied in connection with this work. On account of the comprehensive and detailed character of these investigations it will be some time before results can be published.

TESTS ON A COMMERCIAL SCALE.

It was desired to conduct the tests here reported under conditions that would, as nearly as possible, represent the difficulties experi-

[2] The prices fixed for hogs by the Food Administration did not include those suspected of being soft or oily.

enced by the packers in commercial trade, and to use, so far as possible, their methods in curing, handling, and marketing the product.

On account of the lack of adequate facilities and sufficient funds to conduct the tests independently with a quantity of meat large enough to be representative of the packers' volume, the tests were conducted in one of the large packing plants at Fort Worth and in another at East St. Louis. The two packing companies provided the hogs, which were selected by the representatives of the Bureau of Markets assigned to conduct the tests. The companies also provided all of the necessary help and facilities, and in every way cooperated to the fullest extent. The work at each plant was under the direct supervision of a representative of the Bureau of Markets who was familiar with packing-house conditions and who had had several years' experience in conducting tests of a similar nature. The tests were begun in February and completed in June, 1919.

PLAN OF EXPERIMENT.

A series of 8 tests, in which the carcasses of 600 hogs were utilized, was conducted at Fort Worth, Tex., and a series of 4 tests with 200 hogs was carried on at East St. Louis, Ill.

In making the killing tests at Fort Worth, 24 lots of 25 hogs each were used. There were 8 lots each of the oily, soft, and firm classes. These tests were conducted in series, using 75 hogs for each test at Fort Worth and 50 at East St. Louis. At Fort Worth they were divided into lots of 25 in each of the 3 classes. Lots 1, 2, 3 represent one test and 4, 5, 6 another. The 3 lots in each test were taken through all curing processes and the retaining period at the same time. They were handled under identical conditions, and all tests were conducted alike.

The hogs were bought on the open market, divided, marked, and closely followed through every process of slaughter, curing, and retaining by a bureau representative. Those bought at Fort Worth averaged approximately 175 pounds in weight, while those purchased at East St. Louis were slightly heavier. The lots classed as oily at Fort Worth, however, were omitted in the East St. Louis tests because the cooler experts at that market made no distinction between soft and oily carcasses.

The hogs were selected according to weight, quality, and finish, and care was taken to get them as nearly alike as possible. Care also was used in selecting hogs to see that they came from territory which would as nearly as possible insure their chilling either firm or oily as desired, because there was no known method of determining before it was slaughtered how a live hog would chill out. This was demonstrated several times in these tests and may be seen by a comparison of the live-weight and chill-room records of Tables

1 and 2 of the Appendix. It has been claimed by a few men that hogs whose carcasses would chill out oily or firm could be distinguished when alive, but other tests, as well as those reported in this bulletin, show that it can not be done. At some of the markets, especially in the South, hogs with split, cropped, or deeply notched ears and showing traces of "razorback" characteristics often sell at a discount because the buyers are afraid the carcasses of such hogs will be oily. Such suspicion has sometimes caused those who had fattened their hogs on corn to receive an unwarranted discount. Discrimination of this nature has been one of the causes of general dissatisfaction because the extra expense of making the flesh firm by feeding corn was not justified from the feeder's viewpoint.

In some lots in these tests every hog chilled out as selected, but in others hogs bought as oily chilled firm or soft. It was to be expected, therefore, that some of the lots would contain more than one grade of carcass and for that reason conclusions can not be drawn regarding the shrinkage of such lots in the chill room. The results of the live-weight and chill-room test records are found in Tables 1 and 2 of the Appendix.

The test lots were carefully marked and kept separate from the time they were weighed over the stockyards scales until the end of the retaining period. The latter was 19 days at Fort Worth and 21 days at East St. Louis after the meat was taken out of smoke.

The following weights were taken on each lot:

Live weight.
Warm dressed weight.
Chilled dressed weight.
Wholesale cuts:
- After being cut and trimmed.
- After pumping.
- Out of cure.
- Out of smoke 6 hours.
- Out of smoke 24 hours.
- Out of smoke 6 days.
- Out of smoke 11 days.
- Out of smoke 19 and 21 days.

From these records the gain or loss in weight from each process, together with the total loss, was determined.

METHODS OF HANDLING THE MEAT.

After the carcasses had remained in the cooler temperature for 36 to 44 hours they were examined and classified by the cooler experts of the packing companies as oily, soft, or firm, according to the degree of firmness. The classifications thus made were checked by the representative of the Bureau of Markets.

In cases where the live hogs selected as being firm or oily did not chill out as expected when bought, other carcasses of hogs of the same size and killed the same day which did represent the kind desired, were substituted for the undesirable ones. Each test therefore consisted of 25 carcasses which were uniformly firm, oily, etc.

After the carcasses had been thoroughly chilled and classified they were transferred to the cutting room, where they were cut into the various wholesale cuts. The primal parts used in the tests consisted of regular hams, skinned hams, shoulders, and sides (bellies). Each group was cured and handled separately, but the oily, soft, and firm meat of each test was taken through the various processes at the same time and cured and handled in the same manner.

The various cuts used were placed in hand trucks of known weight, weighed, taken to the pumping table, where they were pumped with a curing solution, returned to another weighed truck, and the meat and truck weighed again. The gain in weight resulting from the pumping process was thus obtained. After the meat had been pumped and weighed it was placed in vats containing a curing solution of equal strength and similar composition and allowed to remain from 30 to 60 days, depending upon the size of the cut. For example, hams remained in the curing solution from 55 to 60 days, while small bellies (bacon) and picnics (shoulders) remained in cure only 30 days. During the curing process the meat was overhauled several times, and each time the weights were taken by the man in charge of the tests. At the close of the curing period the meat was taken from the vats, put into weighed trucks, allowed to drain, and then hung on weighed iron racks (called trees) ready to be smoked. The empty trucks were again weighed in order to obtain the weight of drained meat out of cure and the initial weight of meat in smoke.

The meat was smoked from 19 to 35 hours, depending upon the size of the cut and the customs of the packing plant in which it was smoked. Weights were again taken 6 hours after the meat was taken out of smoke. The weight was used in calculating the loss in smoke. The meat was then allowed to remain on the trees in the room adjoining the smoke room, where the temperature was about 80° F. During this retaining period the meat was weighed after 24 hours and at the end of 6, 11, and 19 days in the Fort Worth tests, and at the end of 6, 12, and 21 days in the East St. Louis tests.

The meat was retained 19 days at Fort Worth and 21 days at East St. Louis, after being smoked, in order to determine the shrinkage that occurs following this process. The packers usually do not hold meat longer than 5 days after it is taken out of smoke. However, it passes through branch, wholesale, and retail houses before it reaches the consumer. This requires some time and shrinkage continues until it is consumed. It was desired, therefore, to hold the meat in these tests for a period approximating the time usually required for it to pass through the wholesale house and retail stores to the consumer. It is believed, therefore, that the shrinkage shown herewith represents practically all the loss incurred on such cuts by those handling the hogs and the resultant meat from the stockyards to the consumer.

Of the 800 hogs used in the tests, the live and dressed weights of 750 of them are shown in the tables included in this bulletin. The carcasses of 50 hogs used in test No. 4 at East St. Louis were selected in the cooler and, for that reason, the live and dressed weights could not be obtained.

The 750 live hogs weighed 130,830 pounds, or an average of 174 pounds per hog, and the average dressing yield was 68.44 per cent of live weight.

The hogs purchased on the East St. Louis market showed a difference in price of $3.10 to $3.40 per 100 pounds between oily and firm hogs. On the Fort Worth market the difference was 2 cents per pound.

Total amounts of meats used at Fort Worth and East St. Louis and loss caused by curing, smoking, and retaining.

	Fresh chilled weight (pounds).	Cooled smoked weight (pounds).	Loss: Chilled weight through smoke.		Weight at end of retaining period (pounds).	Loss: Smoked weight through retaining period.		Total loss chilled weight through retaining period.	
			Pounds.	Per cent.		Pounds.	Per cent.	Pounds.	Per cent.
Oily	14,470	13,741	729	2.30	12,466	1,275	9.28	2,004	13.85
Soft	11,447	10,764	683	5.97	9,624	1,140	10.59	1,823	15.92
Firm	15,909	15,263	646	4.06	13,706	1,557	10.20	2,203	13.85

RESULTS.[3]

The results of these tests, considering the large number, and the fact that they were conducted in two different packing houses, were encouragingly uniform. The shrinkage of the different cuts of the three grades of meat, however, varied in proportion to the size and thickness of the wholesale cut. Throughout all of these tests, both at Fort Worth and East St. Louis, there was a striking similarity in shrinkage between the loss of oily and firm meat. The soft meat, however, showed a heavier shrinkage than either the oily or firm.

GAIN IN WEIGHT CAUSED BY PUMPING AND CURING.

In the process of curing pork in the packing plants practically all of the pickle-cured meat is pumped with a curing solution to insure that it will reach the bones, and especially the joints. This, together with the absorption of the curing liquid in which the meat is kept from 30 to 60 days, increases the weight considerably. The pork cuts cured by the dry salt method, however, lost weight, although they had been pumped.

[3] The total combined results of the tests conducted at Fort Worth and East St. Louis are given here. For those who desire to make a more detailed study of the tests, a more complete report will be found in the Appendix.

In the pumping record in Table 1, it is shown that the increase in weight varies with the different wholesale cuts and the different grades of meat. Comparing the oily and firm meat, it is seen that the firm, dry salt bellies gained 2.86 per cent, and the firm pickle-cured picnics 5.23 per cent, while the oily dry-salt bellies gained 3.59 per cent and the oily pickle-cured picnics 6.78 per cent.

The pickle-cured bacon bellies were the only wholesale cuts that were not pumped. With the exception of the oily lots, however, the gain in cure was much more than in the case of any of the other cuts. The gain in cure was as follows: Oily, 4.43 per cent; soft, 7.92 per cent; firm, 9.62 per cent. In other words, the firm meat gained 5.19 per cent and the soft 3.49 per cent more than the oily. The gain in other cuts was much more uniform, and it should be noted that the great gain in the firm bacon bellies was counterbalanced by correspondingly heavy shrinkage in the smoke and during the retaining period.

LOSS IN SMOKE.

All cuts, regardless of how they were cured, lost weight while being smoked. This loss varied with the different cuts and grades of meat, but with every wholesale cut, except the picnics, the firm meat lost more weight than the oily lots. The soft meat in every case lost more than the firm.

The bacon bellies shrunk almost twice as much as the skinned hams. The shrinkage for all three grades of bacon bellies and skinned hams was as follows:

	Oily.	Soft.	Firm.
	Per cent.	*Per cent.*	*Per cent.*
Bellies	13.19	15.22	14.41
Skinned hams	7.49	7.85	7.84

When both gain and loss are considered, however, from the chilled weight through the smoke, the total loss for all of the cuts of the three grades was: Oily, 5.04 per cent; soft, 5.95 per cent; firm, 4.61 per cent. This indicates that if the meat were sold to the consumer immediately after being smoked the percentage loss of the firm product would have exceeded that of the oily by 0.43 and that of the soft by 1.34 per cent of the original weight. The large consuming centers, however, are too far from the packing plants to make this possible. Days, weeks, and sometimes many months elapse before meat is transferred from the packing plants to the consumer.

During the 19 to 21 days retaining period used in these tests (which was approximately the time required to handle the bulk of the meat) the firm and soft lots were found to shrink more than the

oily. This difference between the oily and firm was sufficient to counterbalance the losses of the oily meat sustained in the other processes.

SHRINKAGE DURING THE RETAINING PERIOD.

The general opinion is that the meat shrinks slowly and only a small amount after being smoked. The results of these tests, however, show that during the first 24 hours after the meat is taken out of smoke the shrinkage is comparatively heavy and that thereafter it continues to shrink, but at a constantly decreasing rate.

Referring to records during the retaining period, the figures appearing in Table 1 indicate that the different grades of meat shrunk during the 19 to 21-day retaining period as follows: Oily, 9.28 per cent; soft, 10.59 per cent; firm, 10.20 per cent. It will be noted, therefore, that, as was the case during the smoking period, the oily meat lost less than either the firm or the soft meat. This is significant, since the opinion has been widely held that during both periods oily meat shrinks more than soft or firm. It should also be noted that with pickle-cured bacon, in which there was a very noticeable difference in gain between the firm and oily lots in the cure, the firm meat lost 1.22 per cent more in smoke and 2.48 per cent more during the retaining period than the oily. In other words, the total loss from chilled weight to the end of the retaining period for firm and oily pickle-cured bellies was practically the same.

TOTAL LOSS IN OILY AND FIRM PORK THE SAME.

The total loss in wholesale smoked cuts from chilled weight to the end of the retaining period for the 14,470 pounds of oily and 15,909 pounds of firm pork was the same, or 13.85 per cent of the chilled weight. The soft meat, of which there was 11,447 pounds at the beginning, showed a shrinkage of 15.92 per cent, or 2.07 per cent more than the firm and oily. All shrinkage percentage comparisons are based upon the total weight of the meat considered. These results were contrary to what might have been expected, in view of the opinion generally held heretofore.

THE TRUE DIFFERENCE IN THE OILY, SOFT, AND FIRM PORK.

Although there is, so far as these tests would indicate, no difference in shrinkage, there is a very noticeable difference in the firmness of oily and firm pork after being chilled, and also a difference in the appearance of the meat before and after being cured.

In the fresh chilled condition, the oily carcass remains very soft and the fat has a slightly yellowish tinge. The carcass and the wholesale cuts handle very much the same as those from a warm carcass. The soft hog carcass is not firm and neither is it oily. The fat is white like that of a firm carcass.

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The firm carcass is solid and firm and the fat is pure white. The cuts are rigid and easily handled.

After the meat is cured and smoked, however, the difference between the oily and firm meat is not so noticeable, and it is difficult for the average person to detect one from the other from outward appearances. After being smoked and retained for 10 days the ham and shoulder cuts of the oily hogs were just as firm to the touch as similar cuts that had been classed as firm in the cooler. The oily bacon bellies, however, remained soft, were difficult to slice, and the constant oozing of the oil made them unsatisfactory to handle in retail trade.

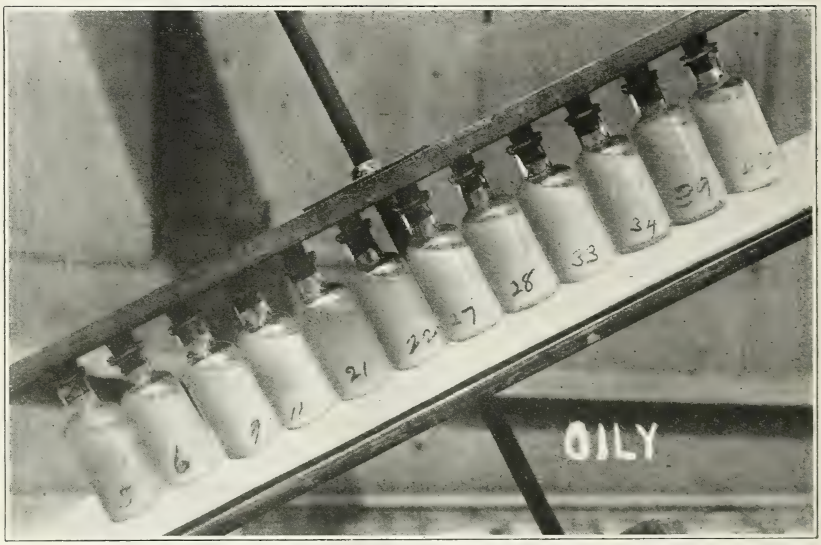

FIG. 1.—Samples of lard from hogs graded as oily. Note that when the bottles are tilted the contents become adjusted to maintain a natural level, thus showing its liquid condition. Photograph taken immediately after samples were removed from a constant temperature of 30° C.

APPEARANCE OF THE MEAT.

According to these tests, the most serious objection to the oily meat was its appearance. Because the oil remained liquid in the cell, the fat of the thinly sliced bacon was almost transparent, giving to it a yellowish appearance instead of being pure white. When the meat was cut, oil in the broken cells smeared over the meat, making it unsatisfactory to handle. The lard also remained as oil instead of being firm and white. This fact is shown by Figures 1, 2, and 3, showing the samples of fat taken from oily, soft, and firm hogs. As shown in Figure 1, the samples of lard taken from oily hogs is liquid and transparent, as indicated by the dark color.

These samples, as well as those of soft and firm, had been held in an ice box at a temperature of 10° C., were removed and placed in a

constant-temperature box for 3 days at 30° C., were then taken out and quickly clamped in a tilted position and photographed, the aim being to get the picture when the fats were at a temperature of 30° C., in order to show the changed position of the fat in the soft and oily lots in comparison with the firm. It will be noted that the samples of fat from oily hogs in Figure 1 and those from soft hogs in Figure 2 moved to seek their level as water will. In the soft samples there is also the dark color, indicating that the fat is semiliquid and transparent. Since they did not all seek their own level to such an extent as did the oily, there is less difference between firm and soft than between firm and oily.

FIG. 2.—Samples of lard from hogs graded as soft. Note the varying degrees of semiliquid condition of the samples as shown by color, and a tendency of the contents to become adjusted to the new level. Samples Nos. 4, 10, 12, 23, 29, and 30 show a greater degree of liquidity than the others, particularly the samples on the extreme ends. Photograph taken immediately after samples were removed from a constant temperature of 30° C.

The fat of firm hogs will remain solid, as shown by Figure 3 and will therefore be a clear white.

These pictures show that there is a distinct difference in the lard of oily, soft, and firm hogs when held at a temperature of 30° C.

This objectionable feature of the oil remaining liquid in soft and oily meats is true in the case of bacon as well as in lard and to a less extent in the other cuts. The soft bacon was not oily, but when cut presented a soft, spongy appearance and was difficult to slice.

Although the bacon was decidedly inferior in appearance and without doubt was more difficult to sell, bacon comprises only a small percentage of the whole carcass, and for that reason it would seem that the discount made on live hogs should not be based entirely

on the difference in selling price of oily and firm bacon, but on the average difference in selling price of all of the cuts and by-products of the hog carcass.

On account of the inferior appearance and handling qualities of oily meat, together with the difference in shrinkage of the soft meat, the buyer of live hogs would seem to be justified in making some discount in price on those that chill out oily or soft. There were no noticeable differences in the keeping qualities or food value of the three grades of meat, but the unattractive appearance and unsatis-

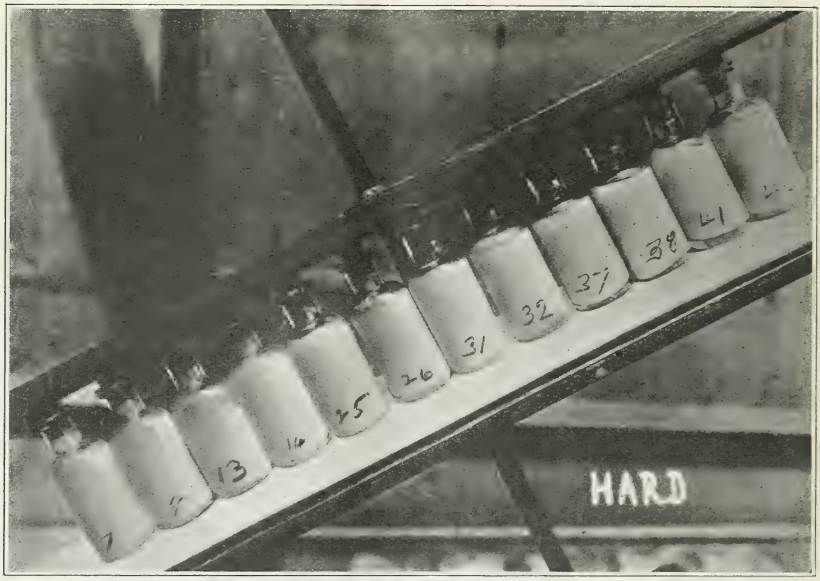

FIG. 3.—Samples of lard from hogs graded as firm or hard. Note that when the bottles are tilted the level of the contents does not change, showing that the lard is firm. Photographs taken immediately after lard was removed from a constant temperature 30° C.

factory handling qualities of soft and oily pork make it more difficult to sell. If the difficulties in selling oily meat cause great delays the shrinkage will naturally be greater, because all meat continues to shrink from the time the animal is slaughtered until the carcass is consumed.

PRICES OF THE THREE GRADES OF MEAT COMPARED.

The preliminary investigations conducted in Texas and Oklahoma to determine whether or not buyers of live hogs actually received a lower price for the pork and pork products from those that chill oily and soft were not extensive enough to allow definite conclusions to be drawn. They did show, however, that a considerably lower price was received for oily bacon, and slightly lower prices were received for lard and the wholesale cuts.

SUMMARY.

Investigation revealed that discounts ranging from 1½ to 7 cents per pound live weight were being made at the different live-stock markets for soft and oily hogs.

Hogs producing soft or oily carcasses can not be distinguished before slaughter from those yielding firm meat.

These tests did not show a distinct difference in the dressing percentages of soft, oily or firm hogs.

Shrinkage in the chill room was relatively the same for all classes of pork.

All cuts used (except pickle-cured bacon) were increased in weight 3.50 per cent to 11 per cent by pumping with a curing solution.

All pickle-cured meat gained in weight in cure.

The results of the tests on hams, skinned and not skinned, were practically the same. Both at East St. Louis and Fort Worth the records show that the oily meat gains less while in cure, but loses less in smoke and during the retaining period than does the firm. The hams classed as soft lose more than oily and less than firm through cure, but through smoke and the retaining period the oily skinned hams at Fort Worth and the regular oily hams at St. Louis shrunk less than the firm.

All meat cured by the dry salt method, except two lots of firm bellies and shoulders, lost weight in cure.

All of the oily meat gained less than firm from chilled weight through cure but, with the exception of picnics, all of the oily smoked cuts lost less weight than the firm during the smoking and retaining periods. All of the meat classed as soft lost more in smoke and during the retaining period than firm.

Oily ham and shoulder cuts, at the end of the retaining period, were just as firm to the touch as those that were classed in the cooler as firm. The appearance, however, was more glossy. The bellies (bacon) not only appeared more glossy and yellowish, but still remained soft and some of them seemed to be spongy.

The melting points of the leaf fats taken from the various lots show that the average of the oily samples was 34.70° F., while that for soft was 40.28° and for firm was 43.40°.

No difference was detected between oily, soft, and firm meats, relative to their keeping qualities, at the close of the retaining periods.

The results of the tests at Fort Worth show total percentage losses in weight of all the smoked wholesale cuts, from chilled weight through cure, smoke, and 19-day retaining period, as follows: Oily, 13.92 per cent; soft, 15.96 per cent; firm, 14.07 per cent.

Results of the tests conducted at East St. Louis show total losses in weight for same wholesale cuts through similar processes as follows: oily, 13.72 per cent; soft, 15.69 per cent; firm, 13.43 per cent.

The results of the tests in the two cities combined showed the same percentage shrinkage for oily and firm pork or 13.85 per cent. The shrinkage for the soft meat was 15.92 per cent, or 2.07 per cent of the total weight, more than the shrinkage of either the oily or firm.

Further investigations will be necessary before conclusions can be drawn regarding the justifiable discount that should be made on live hogs that dress out oily.

APPENDIX.

TABLE 1.—*Live weight and slaughter record of hogs used.*

	Lot No.	Number of hogs in lot.	Total live weight.	Total dressed weight.	Average live weight.	Dressing per-centage.
Fort Worth:			*Pounds.*	*Pounds.*	*Pounds.*	
Bought as oily	1	25	4,120	2,829	164.8	68.66
	4	25	3,650	2,474	146.0	67.78
	7	25	3,300	2,247	132.0	68.09
	10	25	3,430	2,203	137.2	64.22
	13	25	4,930	3,535	197.2	71.70
	16	25	4,830	3,168	193.2	65.59
	19	25	4,450	3,035	178.0	68.20
	22	25	4,850	3,188	194.0	65.73
		200	33,560	22,679	167.8	67.58
Bought as soft	2	25	4,120	2,743	164.8	66.57
	5	25	3,550	2,422	142.0	68.22
	8	25	3,430	2,226	137.2	64.89
	11	25	3,630	2,422	145.2	66.68
	14	25	5,200	3,609	208.0	69.40
	17	25	5,090	3,426	203.6	67.30
	20	25	5,500	3,799	220.0	69.07
	23	25	4,730	3,197	189.6	67.59
		200	35,250	23,844	176.3	67.64
Bought as firm	3	25	3,950	2,720	158.0	68.86
	6	25	3,710	2,529	148.4	68.16
	9	25	3,460	2,397	138.4	69.27
	12	25	3,500	2,377	140.0	67.91
	15	25	5,070	3,576	202.8	70.53
	18	25	4,870	3,383	194.8	69.46
	21	25	5,020	3,452	200.8	68.76
	24	25	5,220	3,783	208.8	72.47
		200	34,800	24,217	174.0	69.82
East St. Louis:						
Bought as oily	1	25	4,860	3,401	194.0	69.97
	2	25	4,530	3,107	181.0	68.58
	3	25	4,300	2,939	172.0	68.34
		75	13,690	9,447	182.0	69.00
Bought as firm	1	25	4,630	3,241	185.0	70.00
	2	25	4,540	3,155	181.0	69.49
	3	25	4,360	2,962	174.0	67.93
		75	13,530	9,358	180.0	69.16
Total		750	130,830	89,545		

These tables are given to show the average weight and dressing percentage of the hogs selected for each test. Although the totals indicate that the hogs bought as firm dressed a higher percentage than those that proved to be oily and soft, the individual lots which contained all oily or soft hogs did not show this difference. Other causes, such as finish and conformation, influence the dressing percentage, so that it can not be stated that these tests prove that firm hogs dress a higher percentage than oily ones. In the East St. Louis test dressing percentages were practically the same.

TABLE 2.—*Chill room record of all classes of carcasses used.*

FORT WORTH, BOUGHT AS SOFT OR OILY.

Lot No.	Dressed weight (pounds).	Chilled dressed weight (pounds).		Loss in chilling.	
				Pounds.	Per cent.
1	2,829	2,768	25 oily 2,768	61	2.16
4	2,474	2,427	6 firm 581 10 soft 958 9 oily 888	47	1.90
7	2,247	2,198	1 soft 70 24 oily 2,126	49	2.18
10	2,203	2,146	2 firm 189 5 soft 458 18 oily 1,499	57	2.59
13	3,535	3,452	4 soft 90 21 oily 2,962 3 firm 341	83	2.35
16	3,168	3,116	8 soft 1,166 14 oily 1,609	52	1.64
19	3,035	2,984	8 firm 931 11 soft 1,305 6 oily 748	51	1.68
22	3,188	3,115	7 soft 940 18 oily 2,175	73	2.29
	22,679	22,206	19 firm 2,042 46 soft 5,387 135 oily 14,777	473	2.09
2	2,743	2,719	25 oily 2,719	24	.87
5	2,422	2,383	11 firm 1,022 8 soft 756 6 oily 605	39	1.61
8	2,226	2,182	2 soft 181 23 oily 2,001	44	1.98
11	2,422	2,353	16 firm 1,500 5 soft 511 4 oily 342	69	2.85
14	3,609	3,547	19 firm 2,734 6 soft 813	62	1.72
17	3,426	3,376	20 firm 2,684 2 soft 320 3 oily 372	50	1.46
20	3,799	3,714	14 soft 1,949 11 oily 1,765	85	2.24
23	3,197	3,123	18 soft 2,262 7 oily 861	74	2.31
	23,844	23,397	66 firm 7,940 55 soft 6,792 79 oily 8,665	447	1.87

FORT WORTH, BOUGHT AS FIRM.

3	2,720	2,681	25 firm 2,681	39	1.43
6	2,529	2,478	22 firm 2,156 2 soft 185 1 oily 137	51	2.02
9	2,397	2,343	19 firm 1,802 3 soft 255 3 oily 296	54	2.25
12	2,377	2,315	15 firm 1,399 3 soft 239 7 oily 677	62	2.61
15	3,576	3,510	24 firm 3,397 1 soft 113	66	1.85
18	3,383	3,324	25 firm 3,324	59	1.74
21	3,452	3,399	25 firm 3,399	53	1.54
24	3,783	3,699	25 firm 3,699	84	2.22
	24,217	23,749	155 firm 21,857 9 soft 792 11 oily 1,100	468	1.93

TABLE 2.—*Chill room record of all classes of carcasses used*—Continued.

EAST ST. LOUIS.

	Lot No.	Dressed weight (pounds).	Chilled dressed weight (pounds).	Loss in chilling.	
				Pounds.	Per cent.
Oily	1	3,401	3,362	39	1.15
	2	2,848	2,811	37	1.30
	3	2,939	2,896	43	1.46
		9,188	9,069	119	1.29
Firm	1	3,241	3,190	51	1.57
	2	3,155	3,126	29	.92
	3	2,962	2,910	52	1.76
		9,358	9,226	132	1.41

The average loss in the chill room as indicated by these tests was 1.74 per cent. There was a variation between the different lots of the same kind of meat and a smaller difference between the shrinkage of the three grades of meat. The total loss when all of the lots are considered both at Fort Worth and East St. Louis is practically the same for the three kinds of meat. In other words these tests do not show that oily and soft meat shrinks more than firm while being chilled.

TABLE 3.—*Pumping record of pickle-cured hams.*

FORT WORTH.

	Lot No.	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
				Pounds.	Per cent.
Oily	1	601	642	41	6.82
	4	550	582	32	5.82
	7	448	487	39	8.71
	10	495	534	39	7.88
		2,094	2,245	151	7.21
Soft	2	547	586	39	7.13
	5	514	538	24	4.67
	8	488	527	39	7.99
	11	535	572	37	6.92
		2,084	2,223	139	6.67
Firm	3	544	575	31	5.70
	6	527	553	26	4.93
	9	492	530	38	7.72
	12	511	544	33	6.46
		2,074	2,202	128	6.17

EAST ST. LOUIS.

Oily	1	687	725	38	5.53
	2	602	628	26	4.31
	3	596	617	21	3.52
	4	505	535	30	5.94
		2,390	2,505	115	4.81
Soft	2	605	629	24	3.97
Firm	1	659	693	34	5.16
	2	644	668	24	3.73
	3	612	634	22	3.59
	4	522	546	24	4.60
		2,437	2,541	104	4.27

TABLE 3.—*Pumping record of pickle-cured hams*—Continued.

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS PUMPING RECORDS ON PICKLE-CURED HAMS.

	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
			Pounds.	Per cent.
Oily:				
Fort Worth	2,094	2,245	151	7.21
St. Louis	2,390	2,505	115	4.81
	4,484	4,750	266	5.93
Soft:				
Fort Worth	2,084	2,223	139	6.67
St. Louis	605	629	24	3.97
	2,689	2,852	163	6.06
Firm:				
Fort Worth	2,074	2,202	128	6.17
St. Louis	2,437	2,541	104	4.27
	4,511	4,743	232	5.14

The hams, after being trimmed and classified, were pumped with a curing solution that caused them to increase considerably in weight. This gain is usually uniform, but with some of the tests a variation was noted. In the Fort Worth tests this gain varied from 4.67 per cent to 7.99 per cent and at St. Louis from 3.52 to 5.94 per cent. It was noted that none of the meat in the St. Louis test gained as much by pumping as did the meat at Fort Worth. This was probably due to a difference in methods of the two packing plants. The combined total percentage gain at Fort Worth and East St. Louis was oily, 5.93; soft, 6.06; firm, 5.14.

TABLE 4.—*Curing records of pickle-cured hams.*

FORT WORTH.

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	1	642	61	16	641	40	6.66
	4	582	59	16	585	35	6.36
	7	487	61	14½	493	45	10.04
	10	534	59	14½	530	35	7.07
		2,245			2,249	155	7.40
Soft	2	586	61	16	596	49	8.96
	5	538	59	16	542	28	5.45
	8	527	61	14½	530	42	8.61
	11	572	59	14½	579	44	8.22
		2,223			2,247	163	7.82
Firm	3	575	61	16	589	45	8.27
	6	553	59	16	562	35	6.64
	9	530	61	14½	542	50	10.16
	12	544	59	14½	549	38	7.44
		2,202			2,242	168	8.10

TABLE 4.—*Curing records of pickle-cured hams*—Continued.

EAST ST. LOUIS.

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	1	725	55	72	717	30	4.37
	2	628	55	72	640	38	6.31
	3	617	55	96	633	37	6.21
	4	535	55	96	538	33	6.53
		2,505			2,528	138	5.77
Soft	2	629	55	72	641	36	5.95
Firm	1	693	55	72	701	42	6.37
	2	668	55	72	688	44	6.83
	3	634	55	96	650	38	6.21
	4	546	55	96	569	47	9.00
		2,541			2,608	171	7.02

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS CURING RECORDS ON PICKLE-CURED HAMS.

	Weight in cure (pounds).	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
			Pounds.	Per cent.
Oily:				
Fort Worth	2,245	2,249	155	7.40
St. Louis	2,505	2,528	138	5.77
Total	4,750	4,777	293	6.53
Soft:				
Fort Worth	2,223	2,247	163	7.82
St. Louis	629	641	36	5.95
Total	2,852	2,888	199	7.40
Firm:				
Fort Worth	2,202	2,242	168	8.10
St. Louis	2,541	2,608	171	7.02
Total	4,743	4,850	339	7.51

The hams in the Fort Worth test remained in the pickle cure 59 to 61 days and at St. Louis 55 days. In addition to the gain noted by pumping, the meat shows an additional gain while in the cure. The total percentage gain by pumping and cure is given in Table 4. This table shows that the gain of the firm meat in the St. Louis tests was similar to the gain of the oily and soft, but lower than the firm in the Fort Worth tests. The gains made by the soft and oily lots in the St. Louis test were much below those shown in the Fort Worth lots of the same grades of meat.

The Fort Worth and St. Louis combined percentage gain of all three grades of hams from chilled weight through cure was oily, 6.53; soft, 7.40; firm, 7.51. This shows that the firm meat gained 0.98 per cent of the total weight more than oily and 0.11 more than soft.

TABLE 5.—*Soaking record of pickle-cured hams.*

FORT WORTH.

	Lot No.	Weight of meat in soak (pounds).	Time meat soaked.		Net weight of drained meat out of soak (pounds).	Temperature of water (° F.).	Gain or loss in soak (pounds).
			Hours.	Minutes.			
Oily	1	641	4	34	641	80	0
	4	585	4	26	587	80	2
	7	493	4	30	489	74	−4
	10	530	4	26	535	74	5
		2,249			2,252		3
Soft	2	596	4	34	598	80	2
	5	542	4	26	549	80	7
	8	530	4	30	531	74	1
	11	579	4	26	582	74	3
		2,247			2,260		13
Firm	3	589	4	34	590	80	1
	6	562	4	26	565	80	3
	9	542	4	30	545	74	3
	12	549	4	26	555	74	6
		2,242			2,255	13	13

EAST ST. LOUIS.

Oily	1	717	4	15	726	70	9
	2	640	3	23	644	70	4
	3	633	3	23	637	70	4
	4	538	3	27	543	70	5
		2,528			2,550		22
Soft	2	641	3	23	640	70	−1
Firm	1	701	4	15	705	70	4
	2	688	3	23	686	70	−2
	3	650	3	23	656	70	6
	4	569	3	27	567	70	−2
		2,608			2,614		6

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SOAKING RECORDS ON HAMS.

	Weight of meat in soak.	Net weight of drained meat out of soak.	Gain or loss in soak.
Oily:	*Pounds.*	*Pounds.*	*Pounds.*
Fort Worth	2,249	2,252	3
East St. Louis	2,528	2,550	22
Total	4,777	4,802	25
Soft:			
Fort Worth	2,247	2,260	13
East St. Louis	641	640	−1
Total	2,888	2,900	12
Firm:			
Fort Worth	2,242	2,255	13
East St. Louis	2,608	2,614	6
Total	4,850	4,869	19

After the meat was taken out of the pickle solution it was drained, weighed, and placed in a soaking solution 3 to 4 hours, the tests at Fort Worth remaining in the soak 4 hours and those at East St. Louis, with the exception of one test, 3 hours. After the meat came out of soak it was allowed to drain and then was weighed and hung on iron racks to be smoked.

The soaking records also varied, especially in the oily lots, therefore they are not considered to be of great importance.

TABLE 6.—*Smoke record of pickle-cured hams.*

FORT WORTH.

	Lot No.	Weight in smoke (pounds).	Hours smoked.	Temperature of smoke-house at—		Net weight of cooled meat (pounds).	Total loss in smoke.		Total loss from chilled fresh weight through smoke.	
				Beginning (° F.).	Close (° F.).		Pounds.	Per cent.	Pounds.	Per cent.
Oily	1	641	21½	82	124	588	53	8.27	13	2.16
	4	587	21½	82	124	547	40	6.81	3	.55
	7	489	20	80	125	448	41	8.38	0	.00
	10	535	20	80	125	485	50	9.34	10	2.02
		2,252				2,068	184	8.17	26	1.24
Soft	2	598	21½	82	124	547	51	8.53	0	.00
	5	549	21½	82	124	506	43	7.83	8	1.56
	8	531	20	80	125	480	51	9.60	8	1.64
	11	582	20	80	125	530	52	8.93	5	.93
		2,260				2,063	197	8.71	21	1.01
Firm	3	590	21½	82	124	543	47	7.97	1	.18
	6	565	21½	82	124	519	46	8.14	8	1.52
	9	545	20	80	125	492	53	9.72	0	.00
	12	555	20	80	125	502	53	9.54	9	1.76
		2,255				2,056	199	8.82	18	.87

EAST ST. LOUIS.

Oily	1	726	33	80	66	678	48	6.61	9	1.31
	2	644	32	69	76	592	52	8.07	10	1.66
	3	637	35	79	82	585	52	8.16	11	1.84
	4	543	35	83	92	498	45	8.29	7	1.74
		2,550				2,353	197	7.73	37	1.55
Soft	2	640	32	69	76	586	54	8.44	19	3.14
Firm	1	705	33	80	66	648	57	8.09	11	1.67
	2	686	32	69	76	635	51	7.43	9	1.40
	3	656	35	79	82	597	59	8.99	15	2.45
	4	567	35	83	92	519	48	8.47	3	.57
		2,614				2,399	215	8.22	38	1.56

TABLE 6.—*Smoke record of pickle-cured hams*—Continued.

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SMOKE RECORDS ON PICKLE-CURED HAMS.

	Weight in smoke (pounds).	Net weight of cooled meat (pounds).	Total loss in smoke.		Total loss from chiled fresh weight through smoke.	
			Pounds.	Per cent.	Pounds.	Per cent.
Oily:						
Fort Worth	2,252	2,068	184	8.17	26	1.24
St. Louis	2,550	2,353	197	7.73	37	1.55
Total	4,802	4,421	381	7.93	63	1.43
Soft:						
Fort Worth	2,260	2,063	197	8.72	21	1.01
St. Louis	640	586	54	8.44	19	3.14
Total	2,900	2,649	251	8.66	40	1.49
Firm:						
Fort Worth	2,255	2,056	199	8.82	18	.87
St. Louis	2,614	2,399	215	8.22	38	1.56
Total	4,869	4,455	414	8.50	56	1.24

The meat in the Fort Worth tests remained in smoke 20 to 21½ hours at a temperature of 124 to 125° F., while in the St. Louis tests it remained in smoke 32 to 35 hours.

The loss in smoke at the two plants, however, did not vary greatly. The average combined losses at the two plants were: Oily, 7.93 per cent; soft, 8.66 per cent; firm, 8.50 per cent. This shows that the firm lost 0.57 per cent and soft 0.73 per cent more than the oily.

When the gain by pumping and curing was considered with the loss in smoke the total loss from chilled weight through smoke was less than 15 per cent for each of the different grades of meat.

TABLE 7.—*Retaining period of pickle-cured hams.*

FORT WORTH.

	Lot No.	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight at end of—		Loss during retaining period.		Chilled fresh weight through retaining period.		
				6 days (lbs.).	19 days (lbs.).	Lbs.	Per cent.	Lbs.	Per cent.	Yield.
Oily	1	588	584	560	533	55	9.35	68	11.31	88.69
	4	547	543	524	503	44	8.04	47	8.54	91.46
	7	448	443	430	400	48	10.71	48	10.71	89.29
	10	485	479	458	422	63	12.99	73	14.75	85.25
		2,068	2,049	1,972	1,858	210	10.15	236	11.27	88.73
Soft	2	547	540	519	490	57	10.42	57	10.42	89.58
	5	506	502	482	459	47	9.29	55	10.70	89.30
	8	480	473	456	417	63	13.12	71	14.55	85.45
	11	530	525	504	465	65	12.26	70	13.08	86.92
		2,063	2,040	1,961	1,831	232	11.25	253	12.14	87.86
Firm	3	543	538	517	490	53	9.76	54	9.93	90.07
	6	519	513	490	462	57	10.98	65	12.33	87.67
	9	492	482	470	430	62	12.60	62	12.60	87.40
	12	502	498	479	439	63	12.55	72	14.09	85.91
		2,056	2,030	1,956	1,821	235	11.43	253	12.20	87.80

TABLE 7.—*Retaining period of pickle-cured hams*—Continued.

EAST ST. LOUIS.

	Lot No.	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight at end of—		Loss during retaining period.		Chilled fresh weight through retaining period.		
				6 days (lbs.).	19 days (lbs.).	Lbs.	Per cent.	Lbs.	Per cent.	Yield.
Oily	1	678	675	660	[1] 632	46	6.78	55	8.00	92.00
	2	592	587	565	[1] 536	56	9.46	66	10.96	89.04
	3	585	580	561	[1] 529	56	9.57	67	11.24	88.76
	4	498	493	476	[1] 446	52	10.44	59	11.68	88.32
		2,353	2,335	2,262	[1] 2,143	210	8.92	247	10.33	89.67
Soft	2	586	581	557	[1] 525	61	10.41	80	13.22	86.78
Firm	1	648	643	622	[1] 593	55	8.49	66	10.02	89.98
	2	635	629	605	[1] 575	60	9.45	69	10.71	89.29
	3	597	590	566	[1] 530	67	11.22	82	13.40	86.60
	4	519	513	496	[1] 464	55	10.60	58	11.11	88.89
		2,399	2,375	2,289	[1] 2,162	237	9.88	275	11.28	88.72

[1] 21 days.

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS RETAINING RECORDS ON PICKLE-CURED HAMS.

	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight at end of—		Loss during retaining period		Chilled fresh weight through retaining period.		
			6 days (lbs.).	19 days (lbs.).	Lbs.	Per cent.	Lbs.	Per cent.	Yield.
Oily:									
Fort Worth	2,068	2,049	1,972	1,858	210	10.15	236	11.27	88.73
East St. Louis	2,353	2,335	2,262	[1] 2,143	210	8.92	247	10.33	89.67
Total	4,421	4,384	4,234	4,001	420	9.50	483	10.77	89.23
Soft:									
Fort Worth	2,063	2,040	1,961	1,831	232	11.25	253	12.14	87.86
East St. Louis	586	581	557	[1] 525	61	10.41	80	13.22	86.78
Total	2,649	2,621	2,518	2,356	293	11.06	333	12.38	87.62
Firm:									
Fort Worth	2,056	2,030	1,956	1,821	235	11.43	253	12.20	87.80
East St. Louis	2,399	2,375	2,289	[1] 2,162	237	9.88	275	11.28	88.72
Total	4,455	4,405	4,245	3,983	472	10.59	528	11.70	88.30

[1] 21 days.

The oily meat at both Fort Worth and East St. Louis lost less weight than the firm during the retaining period, while the soft lost less at East St. Louis but slightly more at Fort Worth. The total percentage loss during the retaining period was: Oily, 9.50 per cent; soft, 11.06 per cent; firm, 10.59 per cent. Adding to this the loss at the end of the smoking process it is shown that the total shrinkage in per cent on hams from the fresh chilled weight to the end of the retaining period was: Oily, 10.77 per cent; soft, 12.38 per cent; firm 11.70 per cent; making a yield of meat for oily, 89.23 per cent; soft, 87.62 per cent; firm, 88.30 per cent. This shows that the oily lost 0.93 per cent less than firm and 1.61 per cent less than soft.

SKINNED HAMS.

In the territory of Fort Worth, Tex., a considerable demand existed for skinned hams; consequently, several tests were conducted in order to determine the difference in shrinkage, if any, between skinned hams and those not skinned. They were selected and divided into lots according to the way they were classed in the cooler, as were the regular hams.

It will be noticed that the oily hams increased 5.41 per cent, soft 4.99 per cent, and firm 4.63 per cent.

The increase in weight, however, in cure, plus the pumping, was reversed, as shown by the following percentages of the totals: Oily, 6.62 per cent; soft, 6.85 per cent; firm, 9.15 per cent. In other words, the oily gained 1.21 per cent, soft 1.86 per cent, and firm 4.52 per cent while in cure.

One of the objections held against oily pork was that it did not take the cure or increase in weight as did firm pork, and these figures, as well as the following data, show this to be true.

In the tests with 12 lots of skinned hams the firm meat increased 2.53 per cent more than the oily and 2.30 per cent more than the soft, from chilled weight through cure.

TABLE 8.—*Pumping record of pickle-cured skinned hams—Fort Worth.*

	Lot No.	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
				Pounds.	Per cent.
Oily	13	655	691	36	5.50
	16	682	718	36	5.28
	19	628	659	31	4.94
	22	602	638	36	5.98
		2,567	2,706	139	5.41
Soft	14	774	810	36	4.65
	17	705	739	34	4.82
	20	666	699	33	4.95
	23	642	678	36	5.61
		2,787	2,926	139	4.99
Firm	15	685	717	32	4.67
	18	584	613	29	4.97
	21	761	792	31	4.07
	24	648	680	32	4.94
		2,678	2,802	124	4.63

TABLE 9.—*Curing record of pickle-cured skinned hams—Fort Worth.*

	Lot No.	Weight in cure (pounds).	Days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	13	691	59	16	695	40	6.11
	16	718	58	16	723	41	6.01
	19	659	61	15½	675	47	7.48
	22	638	60	15½	644	42	6.98
		2,696	.....	.....	2,737	170	6.62
Soft	14	810	59	16	819	45	5.81
	17	739	58	16	753	48	6.81
	20	699	61	15½	716	50	7.51
	23	678	60	15½	690	48	7.48
		2,926	.....	.....	2,978	191	6.85
Firm	15	717	59	16	739	54	7.88
	18	613	58	16	646	62	10.62
	21	792	61	15½	821	60	7.88
	24	680	60	15½	717	69	10.65
		2,802	.....	.....	2,923	245	9.15

TABLE 10.—*Soaking record of pickle-cured skinned hams—Fort Worth.*

	Lot No.	Weight of meat in soak (pounds).	Time meat soaked.		Net weight of drained meat out of soak (pounds).	Temperature of water (° F.).	Gain or loss in soak (pounds).
			Hours.	Minutes.			
Oily	13	695	3	56	693	76	−2
	16	723	3	52	726	76	3
	19	675	4	4	673	72	−2
	22	644	4	.....	645	72	1
		2,737	.....	.....	2,737	.....	0
Soft	14	819	3	56	820	76	1
	17	753	3	52	751	76	−2
	20	716	4	4	717	72	1
	23	690	4	.....	691	72	1
		2,978	.....	.....	2,979	.....	1
Firm	15	739	3	56	736	76	−3
	18	646	3	52	643	76	−3
	21	821	4	4	817	72	−4
	24	717	4	.....	714	72	−3
		2,923	.....	.....	2,910	.....	−13

TABLE 11.—*Smoke record of pickle-cured skinned hams—Fort Worth.*

	Lot No.	Weight in smoke (lbs.).	Hours smoked.	Temperature of smoke house at—		Net weight of cooled meat (lbs.).	Total loss in smoke.		Total loss or gain from chilled fresh weight through smoke.	
				Beginning.	Close.		Lbs.	Per cent.	Lbs.	Per cent.
				° F.	° F.					
Oily	13	693	23	82	128	650	43	6.20	5	.76
	16	726	23	82	128	678	48	6.61	4	.59
	19	673	19	88	132	616	57	8.47	12	1.91
	22	645	19	88	132	588	57	8.84	14	2.33
		2,737	.....	.....	.....	2,532	205	7.49	35	1.36
Soft	14	820	23	82	128	764	56	6.83	10	1.29
	17	751	23	82	128	697	54	7.19	8	1.13
	20	717	19	88	132	651	66	9.21	15	2.25
	23	691	19	88	132	633	58	8.39	9	1.40
		2,979	.....	.....	.....	2,745	234	7.85	42	1.51
Firm	15	736	23	82	128	687	49	6.66	+2	+.29
	18	643	23	82	128	596	47	7.31	+12	+2.05
	21	817	19	88	132	747	70	8.57	14	1.84
	24	714	19	88	132	652	62	8.68	+4	+.62
		2,910	.....	.....	.....	2,682	228	7.84	+4	+.15

The total percentage loss in smoke of the skinned hams shown in Table 11 was: Oily, 7.49 per cent; soft, 7.85 per cent; firm, 7.84 per cent. This loss is about 1 per cent less than the loss for hams not skinned. The loss from chilled weight through smoke was: Oily, 1.36 per cent; soft, 1.51 per cent. The firm lots made a slight gain instead of losing in weight, due to a very large increase in weight of lots 18 and 24 while in cure.

TABLE 12.—*Retaining period of pickle-cured skinned hams, Fort Worth.*

	Lot No.	Weight cooled smoked meat (pounds).	Weight of meat 24 hours after smoked (pounds).	Net weight at end of—		Loss during retaining period.		Green weight through retaining period.		
				6 days (pounds).	19 days (pounds).	Pounds.	Per cent.	Total loss.		Per cent yield.
								Pounds.	Per cent.	
Oily	13	650	643	626	591	59	9.08	64	9.77	90.23
	16	678	669	646	598	80	11.80	84	12.32	87.68
	19	616	616	596	564	52	8.44	64	10.19	89.81
	22	588	581	553	514	74	12.59	88	14.62	85.38
		2,532	2,509	2,421	2,267	265	10.47	300	11.68	88.32
Soft	14	764	759	732	689	75	9.82	85	10.98	89.02
	17	697	691	664	618	79	11.33	87	12.34	87.66
	20	651	643	614	569	82	12.60	97	14.56	85.44
	23	633	622	593	551	82	12.95	91	14.17	85.83
		2,745	2,715	2,603	2,427	318	11.58	360	12.92	87.08
Firm	15	687	680	659	613	74	10.77	72	10.51	89.49
	18	596	591	570	535	61	10.23	49	8.39	91.61
	21	747	738	704	660	87	11.65	101	13.27	86.73
	24	652	644	615	576	76	11.66	72	11.11	88.89
		2,682	2,653	2,548	2,384	298	11.11	294	10.98	89.02

During the retaining period of the skinned hams the loss was oily, 10.47 per cent; soft, 11.58 per cent; firm 11.11 per cent, which shows that oily meat shrunk 0.64 per cent of the total weight less than firm and 1.11 per cent less than soft.

The total shrinkage from chilled weight through the 19-day retaining period as shown in Table 12 was oily, 11.68 per cent; soft, 12.92 per cent; firm, 10.98 per cent. In other words, the oily lost 0.7 per cent and soft 1.94 per cent more than the hams classed as firm.

Comparing the total shrinkage of skinned hams with the total shrinkage of hams not skinned, it is found that—

Oily skinned hams lost 0.41 per cent more than oily hams not skinned.
Soft skinned hams lost 0.78 per cent more than soft hams not skinned.
Firm skinned hams lost 1.22 per cent less than firm hams not skinned.

PICNICS (SHOULDERS) PICKLE CURED.

The demand for certain cuts of the shoulders made it impracticable to make tests on the same cut at both Fort Worth and East St. Louis; consequently, all of the tests at Fort Worth, with one exception, were made with the shoulder cut known as New Orleans shoulder and cured by the dry-salt method, while the cut known as picnic was used at East St. Louis and cured in sweet pickle. The shoulder cut of one test at Fort Worth was made into picnics and was pickle cured.

The pumping records of the one test of pickle-cured picnics at Fort Worth show that the percentage gain was almost double that of the East St. Louis tests of the same cut. The variation is not great between firm, soft, and oily at each plant, but it does show how one plant varies from another.

TABLE 13.—*Pumping record of pickle-cured picnics.*

FORT WORTH.

	Lot No.	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
				Pounds.	Per cent.
Oily	1	257	283	26	10.12
Soft	2	232	258	26	11.21
Firm	3	238	260	22	9.24

EAST ST. LOUIS.

Oily	1	241	255	14	5.81
	2	251	268	17	6.77
	3	242	252	10	4.31
	4	189	202	13	5.88
		923	977	54	5.85
Soft	2	271	288	17	6.27
Firm	1	272	286	14	5.15
	2	267	281	14	5.24
	3	267	277	10	3.75
	4	294	304	10	3.40
		1,100	1,148	48	4.36

COMBINED RESULT OF FORT WORTH AND EAST ST. LOUIS PUMPING RECORDS ON PICKLE-CURED PICNICS.

Oily:				
Fort Worth	257	283	26	10.12
East St. Louis	923	977	54	5.85
	1,180	1,260	80	6.78
Soft:				
Fort Worth	232	258	26	11.21
East St. Louis	271	288	17	6.27
	503	546	43	8.55
Firm:				
Fort Worth	238	260	22	9.24
East St. Louis	1,100	1,148	48	4.36
	1,338	1,408	70	5.23

TABLE 14.—*Curing record of pickle-cured picnics.*

FORT WORTH.

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	1	283	33	17	282	25	9.73
Soft	2	258	33	17	262	30	12.93
Firm	3	260	33	17	265	27	11.34

TABLE 14.—*Curing record of pickle-cured picnics*—Continued.

EAST ST. LOUIS.

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	1	255	30	72	250	9	3.73
	2	268	30	72	265	14	5.58
	3	252	31	72	259	17	7.02
	4	202	31	72	200	11	5.82
		977			974	51	5.53
Soft	2	288	30	72	297	26	9.59
Firm	1	286	30	72	289	17	6.25
	2	281	30	72	286	19	7.12
	3	277	31	72	283	16	5.99
	4	304	31	72	317	23	7.82
		1,148			1,175	75	6.82

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS CURING RECORDS ON PICKLE-CURED PICNICS.

Oily:						
Fort Worth	283			282	25	9.73
East St. Louis	977			974	51	5.53
	1,260			1,256	76	6.44
Soft:						
Fort Worth	258			262	30	12.93
East St. Louis	288			297	26	9.59
	546			559	56	11.13
Firm:						
Fort Worth	260			265	27	11.34
East St. Louis	1,148			1,175	75	6.82
	1,408			1,440	102	7.62

The shoulder cut known as the picnic is a small piece of meat, therefore is not allowed to remain in the cure as long as the hams. In the Fort Worth tests they remained 33 days in cure and at East St. Louis 30 to 31 days.

The percentage gain by pumping and curing was very much the same as that for the hams in the oily and firm grades at East St. Louis, where four lots of each kind of meat were tested, but in the test where only one lot of each grade was used the gain was very much greater. The combined totals, however, show that the oily gained 6.44 per cent, soft 11.13 per cent, and firm 7.62 per cent, or the firm 1.18 per cent and soft 3.51 per cent more than the oily.

At certain seasons of the year some of this kind of pork is sold to the trade without being smoked. These results indicate that when this is done the meat actually gains from 5.53 per cent to 12.93 per cent, depending upon the grade of meat.

TABLE 15.—*Soaking record of pickle-cured picnics.*

FORT WORTH.

	Lot No.	Weight of meat in soak (pounds).	Time meat soaked.		Net weight of drained meat out of soak (pounds).	Temperature of water (° F.).	Gain or loss in soak (pounds).
			Hours.	Minutes.			
Oily	1	282	2	33	284	80	2
Soft	2	262	2	33	257	80	−5
Firm	3	265	2	33	268	80	3

EAST ST. LOUIS.

Oily	1	250	1	45	252	70	2
	2	265	1	55	268	70	3
	3	259	1	55	261	70	2
	4	200	2	.....	200	70	0
		974	.....	.....	981	.....	7
Soft	2	297	1	55	295	70	−2
Firm	1	289	1	45	289	70	0
	2	286	1	55	287	70	1
	3	283	1	55	281	70	−2
	4	317	2	.....	314	70	−3
		1,175	.....	.....	1,171	.....	−4

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SOAKING RECORDS ON PICKLE-CURED PICNICS.

Oily:							
Fort Worth	.....	282	.....	.....	284	.....	2
St. Louis	.....	974	.....	.....	981	.....	7
		1,256	.....	.....	1,265	.....	9
Soft:							
Fort Worth	.....	262	.....	.....	257	.....	−5
St. Louis	.....	297	.....	.....	295	.....	−2
		559	.....	.....	552	.....	−7
Firm:							
Fort Worth	.....	265	.....	.....	268	.....	3
St. Louis	.....	1,175	.....	.....	1,171	.....	−4
		1,440	.....	.....	1,439	.....	−1

TABLE 16.—*Smoke record of pickle-cured picnics.*

FORT WORTH.

	Lot No.	Weight in smoke (pounds).	Hours smoked.	Temperature of smokehouse at—		Net weight of cooled meat (pounds).	Total loss in smoke.		Total loss from chilled fresh weight through smoke.	
				Beginning (° F.).	Close (° F.).		Pounds.	Per cent.	Pounds.	Per cent.
Oily	1	284	28	85	125	248	36	12.68	9	3.50
Soft	2	257	28	85	125	226	31	12.06	6	2.59
Firm	3	268	28	85	125	235	33	12.31	3	1.26

TABLE 16.—*Smoke record of pickle-cured picnics*—Continued.

EAST ST. LOUIS.

	Lot No.	Weight in smoke (pounds).	Hours smoked.	Temperature of smoke-house at—		Net weight of cooled meat (pounds).	Total loss in smoke.		Total loss from chilled fresh weight through smoke.	
				Beginning (° F.)	Close (° F.).		Pounds.	Per cent.	Pounds.	Per cent.
Oily	1	252	34½	76	63	225	27	10.71	16	6.64
	2	268	36	62	74	239	29	10.83	12	4.78
	3	261	34½	82	68	228	33	12.64	14	5.79
	4	200	32½	72	70	179	21	10.50	10	5.29
		981	.....	.....	.....	871	110	11.21	52	5.63
Soft	2	295	36	62	74	261	34	11.53	10	3.69
Firm	1	289	34½	76	63	255	34	11.76	17	6.25
	2	287	36	62	74	257	30	10.45	10	3.75
	3	281	34½	82	68	248	33	11.74	19	7.12
	4	314	32½	72	70	286	28	8.92	8	2.72
		1,171	.....	.....	.....	1,046	125	10.67	54	4.91

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SMOKE RECORDS ON PICKLE-CURED PICNICS.

Oily:										
Fort Worth	.....	284	.....	.....	.....	248	36	12.68	9	3.50
St. Louis	.....	981	.....	.....	.....	871	110	11.21	52	5.63
		1,265	.....	.....	.....	1,119	146	11.54	61	5.17
Soft:										
Fort Worth	.....	257	.....	.....	.....	226	31	12.06	6	2.59
St. Louis	.....	295	.....	.....	.....	261	34	11.53	10	3.69
		552	.....	.....	.....	487	65	11.78	16	3.18
Firm:										
Fort Worth	.....	238	.....	.....	.....	235	33	12.31	3	1.26
St. Louis	.....	1,171	.....	.....	.....	1,046	125	10.67	54	4.91
		1,439	.....	.....	.....	1,281	158	10.98	57	4.26

The smoke records of picnics show that the loss in Fort Worth tests was greater than at St. Louis and the oily meats shrank more than the firm.

The combined results were as follows: Oily, 11.54 per cent; soft, 11.78 per cent; firm, 10.98 per cent. The loss from chilled weight through smoke for both Fort Worth and East St. Louis show that the oily shrank 0.91 per cent more than the firm and 1.99 per cent more than the soft.

TABLE 17.—*Retaining period of pickle-cured picnics.*

FORT WORTH.

	Lot No.	Net weight cooled smoked (lbs.).	Net weight of meat 24 hours after (lbs.).	Net weight at end of—		Loss during retaining.		Green weight through retaining period.		
				6 days (lbs.).	21 days (lbs.).	Pounds.	Per cent.	Loss (lbs.).	Per cent—	
									Loss.	Yield.
Oily	1	248	[1] 245	229	[2] 211	37	14.92	46	17.90	82.10
Soft	2	226	[1] 224	209	[2] 191	35	15.49	41	17.67	82.33
Firm	3	235	[1] 234	219	[2] 203	32	13.62	35	14.71	85.29

TABLE 17.—*Retaining period of pickle-cured picnics*—Continued.

EAST ST. LOUIS.

	Lot No.	Net weight cooled smoked (lbs.).	Net weight of meat 24 hours after (lbs.)	Net weight at end of—		Loss during retaining.		Green weight through retaining period.		
				6 days (lbs.).	21 days (lbs.).	Pounds.	Per cent.	Loss (lbs.).	Per cent—	
									Loss.	Yield.
Oily	1	225	223	219	201	24	10.67	40	16.60	83.40
	2	239	235	224	208	31	12.97	43	17.13	82.87
	3	228	223	216	200	28	12.28	42	17.36	82.64
	4	179	173	164	150	29	16.20	39	20.63	79.37
		871	854	823	759	112	12.86	164	17.77	82.23
Soft	1	261	257	243	223	38	14.56	48	17.71	82.29
Firm	1	255	253	246	226	29	11.37	46	16.91	83.09
	2	257	253	242	227	30	11.67	40	14.98	85.02
	3	248	242	233	215	33	13.31	52	19.48	80.52
	4	286	280	268	250	36	12.59	44	14.97	85.03
		1,046	1,028	989	918	128	12.24	182	16.55	83.45

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS RETAINING RECORDS ON PICKLE-CURED PICNICS.

Oily:									
Fort Worth	248	245	229	211	37	14.92	46	17.90	82.10
East St. Louis	871	854	823	759	112	12.86	164	17.77	82.23
	1,119	1,099	1,052	970	149	13.32	210	17.80	82.20
Soft:									
Fort Worth	226	224	209	191	35	15.49	41	17.67	82.33
East St. Louis	261	257	243	223	38	14.56	48	17.71	82.29
	487	481	452	414	73	14.99	89	17.69	82.31
Firm:									
Fort Worth	235	234	219	203	32	13.62	35	14.71	85.29
East St. Louis	1,046	1,028	989	918	128	12.24	182	16.55	83.45
	1,281	1,262	1,208	1,121	160	12.49	217	16.22	83.78

[1] 36 hours. [2] 18 days.

The percentage shrinkage during the retaining period, as shown in the combined results, was: Oily, 13.32 per cent; soft, 14.99 per cent; firm, 12.49 per cent; or the oily picnics shrank 0.83 per cent and the soft 2.5 per cent more than the firm.

The total loss from chilled weight through the retaining period was heavier for picnics than for any of the other cuts. This wholesale cut shows that oily meat shrank 1.58 per cent and soft 1.47 per cent more than firm.

TABLE 18.—*Curing record of pickle-cured bellies (bacon).*

FORT WORTH.

	Lot No.	Chilled fresh weight (pounds).	Number of days in cure.	Hours meat drained.	Net weight of drained meat (pounds).	Gain from chilled weight through cure.	
						Pounds.	Per cent.
Oily	1	444	32	16	458	14	3.15
	4	559	31	16	578	19	3.40
	7	436	42	19	465	29	6.65
	10	378	42	19	396	18	4.76
		1,817	.....	.....	1,897	80	4.40
Soft	2	470	32	16	512	42	8.94
	5	466	31	16	495	29	6.22
	8	399	42	19	431	32	8.02
	11	432	42	19	466	34	7.87
		1,767	.....	.....	1,904	137	7.75
Firm	3	501	32	16	550	49	9.78
	6	476	31	16	512	36	7.56
	9	442	42	19	490	48	10.86
	12	458	42	19	503	45	9.83
		1,877	.....	.....	2,055	178	9.48
EAST ST. LOUIS.							
Oily	1	524	30	72	534	10	1.91
	2	439	30	72	465	26	5.92
	3	429	31	72	457	28	6.53
	4	316	31	72	328	12	3.80
		1,708	.....	.....	1,784	76	4.45
Soft	2	443	30	72	481	38	8.58
Firm	1	550	30	72	598	48	8.73
	2	509	30	72	557	48	9.43
	3	439	31	72	476	37	8.43
	4	585	31	72	655	70	11.97
		2,083	.....	.....	2,286	203	9.75

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS CURING RECORDS ON BELLIES (BACON).

Oily:						
Fort Worth	1,817	.....	.....	1,897	80	4.40
East St. Louis	1,708	.....	.....	1,784	76	4.45
	3,525	.....	.....	3,681	156	4.43
Soft:						
Fort Worth	1,767	.....	.....	1,904	137	7.75
East St. Louis	443	.....	.....	481	38	8.58
	2,210	.....	.....	2,385	175	7.92
Firm:						
Fort Worth	1,877	.....	.....	2,055	178	9.48
East St. Louis	2,083	.....	.....	2,286	203	9.75
	3,960	.....	.....	4,341	381	9.62

Four tests were made on pickle-cured bellies (bacon) at each of the packing plants. The bacon was not pumped as were the other cuts of meat, but in the curing solution it gained practically the same percentage in weight. One very noticeable feature about the oily meat was that it did not gain in cure like the firm and soft. In fact, the firm meat gained more than twice as much as the oily while in cure, both at Fort Worth and East St. Louis. This variation, however, should be kept in mind and compared with the difference in losses in smoke and during the retaining period.

Usually a heavy gain in cure is followed by a correspondingly heavy loss in smoke and during retaining period.

The combined results show the percentage gain as follows: Oily, 4.43 per cent; soft, 7.92 per cent; firm, 9.62 per cent.

TABLE 19.—*Soaking record of pickle-cured bellies (bacon).*

FORT WORTH.

	Lot No.	Weight of meat in soak (pounds).	Time meat soaked.		Net weight of drained meat out of soak (pounds).	Temperature of water (° F.).	Gain or loss in soak (pounds).
			Hours.	Minutes.			
Oily	1	458	2	12	463	80	5
	4	578	2	8	574	80	−4
	7	465	2	12	464	72	−1
	10	395	2	12	398	72	2
		1,897			1,899		2
Soft	2	512	2	12	507	80	−5
	5	495	2	8	495	80	0
	8	431	2	12	432	72	1
	11	466	2	12	462	72	−4
		1,904			1,895		−8
Firm	3	550	2	12	574	80	24
	6	512	2	8	514	80	2
	9	490	2	12	491	72	1
	12	503	2	12	505	72	2
		2,055			2,084		29

EAST ST. LOUIS.

Oily	1	534	1	45	539	70	5
	2	465	1	55	469	70	4
	3	457	1	55	462	70	5
	4	328	2		332	70	4
		1,784			1,802		18
Soft	2	481	1	55	483	70	2
Firm	1	598	1	45	600	70	2
	2	557	1	55	558	70	1
	3	476	1	55	477	70	1
	4	655	2		652	70	−3
		2,283			2,287		1

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SOAKING RECORD ON BELLIES (BACON).

Oily:				
Fort Worth	1,897		1,899	2
St. Louis	1,784		1,802	18
	3,681		3,701	20
Soft:				
Fort Worth	1,904		1,896	−8
St. Louis	481		483	2
	2,385		2,379	−6
Firm:				
Fort Worth	2,055		2,084	29
St. Louis	2,286		2,287	1
	4,341		4,371	30

The meat varied considerably in soak. This was due to the fact that the meat was weighed each time out of a liquid which would naturally cause a variation.

TABLE 20.—*Smoke record of pickle-cured bellies (bacon).*

FORT WORTH.

	Lot No.	Weight in smoke (pounds).	Hours smoked.	Temperature of smoke house.		Net weight of cooled meat (pounds).	Total loss in smoke.		Total loss from chilled fresh weight through smoke.	
				Beginning (° F.).	Close (° F.).		Pounds.	Per cent.	Pounds.	Per cent.
Oily	1	463	28	85	125	400	63	13.61	44	9.91
	4	574	28	85	125	516	58	10.10	43	7.69
	7	464	26½	100	124	409	55	11.85	27	6.19
	10	398	26½	100	124	323	75	18.84	55	14.55
		1,899				1,648	251	13.22	169	9.30
Soft	2	507	28	85	125	430	77	15.19	40	8.51
	5	495	28	85	125	428	67	13.54	38	8.15
	8	432	26½	100	124	364	68	15.74	35	8.77
	11	462	26½	100	124	384	78	16.88	48	11.11
		1,896				1,606	290	15.30	161	9.11
Firm	3	574	28	85	125	472	102	17.77	29	5.79
	6	514	28	85	125	436	78	15.18	40	8.40
	9	491	26½	100	124	417	74	15.07	25	5.66
	12	505	26½	100	124	424	81	16.04	34	7.42
		2,084				1,749	335	16.07	128	6.82

EAST ST. LOUIS.

Oily	1	539	34½	76	63	478	61	11.32	46	8.78
	2	469	36	62	74	404	65	13.86	35	7.97
	3	462	34½	82	68	398	64	13.85	31	7.23
	4	332	32½	72	70	285	47	14.16	31	9.81
		1,802				1,565	237	13.15	143	8.37
Soft	2	483	36	62	74	411	72	14.91	32	7.22
Firm	1	600	34½	76	63	520	80	13.33	30	5.45
	2	558	36	62	74	486	72	12.90	23	4.52
	3	477	34½	82	68	402	75	15.72	37	8.43
	4	652	32½	72	70	584	68	10.43	1	.17
		2,287				1,992	295	12.90	91	4.37

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS SMOKE RECORDS ON PICKLE-CURED BELLIES (BACON).

Oily:										
Fort Worth		1,899				1,648	251	13.22	169	9.30
St. Louis		1,802				1,565	237	13.15	143	8.37
		3,701				3,213	488	13.19	312	8.85
Soft:										
Fort Worth		1,896				1,606	290	15.30	161	9.11
St. Louis		483				411	72	14.91	32	7.22
		2,379				2,017	362	15.22	193	8.73
Firm:										
Fort Worth		2,084				1,749	335	16.07	128	6.82
St. Louis		2,287				1,992	295	12.90	91	4.37
		4,371				3,741	630	14.41	219	5.53

In the Fort Worth tests lots 1 to 6 were held in the smoke 28 hours at a temperature ranging from 85° to 125° F., while lots 7 to 12 were smoked 26½ hours at a temperature ranging between 100° and 124° F.

The percentage shrinkage in smoke of the total amount of each kind of meat in the Fort Worth tests was: Oily, 13.22 per cent; soft, 15.30 per cent; firm, 16.07 per cent. This shows that the firm bellies (bacon) shrunk 2.85 per cent more than oily and 0.77 per cent more than the soft.

The same kind of meat cured in a similar manner in St. Louis was smoked from 32 to 36 hours at approximately the same temperature and showed a shrinkage of: Oily, 13.15 per cent; soft, 14.91 per cent; firm 12.90 per cent. In these tests the firm lost 0.25 per cent less than the oily and 2.01 per cent less than the soft.

The combined results of Fort Worth and St. Louis tests while in smoke show that oily meat lost 1.22 per cent less than firm and 2.03 per cent less than soft. However, the loss from chilled weight through smoke shows that the firm meat lost 3.32 per cent less than oily and 3.20 per cent less than soft.

TABLE 21.—*Retaining record of pickle-cured bellies (bacon).*

FORT WORTH.

	Lot No.	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight at end of—		Loss during retaining period.		Green weight through retaining period.		
				6 days (lbs.).	18 days (lbs.).	Pounds.	Per cent.	Total loss.		Per cent yield.
								Pounds.	Per cent.	
Oily	1	400	[1] 394	376	360	40	10.00	84	18.92	81.08
	4	516	[1] 513	494	480	36	6.98	79	14.13	85.87
	7	409	402	393	375	34	8.31	61	13.99	86.01
	[2] 10	.....	.....	.....	.....	.....	.....	.....	.....	.....
		1,325	1,309	1,263	1,215	110	8.30	224	15.56	84.44
Soft	2	430	[1] 423	403	385	45	10.47	85	18.09	81.91
	5	428	[1] 424	408	392	36	8.41	74	15.88	84.12
	8	364	352	337	310	54	14.84	89	22.31	77.69
	11	384	375	361	334	50	13.02	98	22.69	77.31
		1,606	1,574	1,509	1,421	185	11.52	346	19.58	80.42
Firm	3	472	[1] 468	445	426	46	9.75	75	14.97	85.03
	6	436	[1] 432	408	388	48	11.01	88	18.49	81.51
	9	417	407	395	366	51	12.23	76	17.19	82.81
	12	424	411	395	366	58	13.68	92	20.09	79.91
		1,749	1,718	1,643	1,546	203	11.61	331	17.63	82.37

EAST ST. LOUIS.

Oily	1	478	475	469	[3] 445	33	6.90	79	15.08	84.92
	2	404	399	384	[3] 367	37	9.16	72	16.40	83.60
	3	398	391	382	[3] 364	34	8.54	65	15.15	84.85
	4	285	279	268	[3] 254	31	10.88	62	19.62	80.38
		1,565	1,544	1,503	[3] 1,430	135	8.63	278	16.28	83.72
Soft	2	411	405	386	[3] 364	47	11.44	79	17.83	82.17
Firm	1	520	514	502	[3] 471	49	9.42	79	14.36	85.64
	2	486	478	460	[3] 439	47	9.67	70	13.75	86.25
	3	402	392	378	[3] 354	48	11.94	85	19.36	80.64
	4	584	574	551	[3] 521	63	10.79	64	10.94	89.06
		1,992	1,958	1,891	[3] 1,785	207	10.39	298	14.31	85.69

[1] 36 hours.
[2] 5 pieces were taken out by mistake, therefore lot 10 is not considered in retaining period record.
[3] 21 days.

TABLE 21.—*Retaining re cord of pickle-cured bellies (bacon)*—Continued.

COMBINED RESULTS OF FORT WORTH AND EAST ST. LOUIS RETAINING RECORDS ON PICKLE-CURED BELLIES (BACON).

	Lot No.	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight at end of—		Loss during retaining period.		Green weight through retaining period.		
				6 days (lbs.).	18 days (lbs.).	Pounds.	Per cent.	Total loss.		Per cent yield.
								Pounds.	Per cent.	
Oily:										
Fort Worth		1,325	1,309	1,263	1,215	110	8.30	224	15.56	84.44
St. Louis		1,565	1,544	1,503	1,430	135	8.63	278	16.28	83.72
		2,890	2,853	2,766	2,645	245	8.48	502	15.95	84.05
Soft:										
Fort Worth		1,606	1,574	1,509	1,421	185	11.52	346	19.58	80.42
St. Louis		411	405	386	364	47	11.44	79	17.83	82.17
		2,017	1,979	1,895	1,785	232	11.50	425	19.23	80.77
Firm:										
Fort Worth		1,749	1,718	1,643	1,546	203	11.61	331	17.63	82.37
St. Louis		1,992	1,958	1,891	1,785	207	10.39	298	14.31	85.69
		3,741	3,676	3,534	3,331	410	10.96	629	15.88	84.12

The combined results show that during the retaining period the oily meat shrank 2.48 per cent less than firm and 3.12 per cent less than soft.

The total shrinkage from chilled weight through all the processes to the end of the retaining period was: Oily, 15.96 per cent; soft, 19.23 per cent; firm, 15.88 per cent; or the oily meat showed a shrinkage of 0.07 per cent and the soft 3.35 per cent more than firm. Although there was a very great difference in the weight of the lots of oily and firm bacon out of cure, it was practically equalized at the end of the retaining period.

TABLE 22.—*Pumping record of dry salt cured bellies (sides), Fort Worth.*

	Lot No.	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
				Pounds.	Per cent.
Oily	13	850	882	32	3.76
	16	707	728	21	2.97
	19	885	916	31	3.50
	22	650	677	27	4.15
		3,092	3,203	111	3.59
Soft	14	1,000	1,033	33	3.30
	17	778	805	27	3.47
	20	795	820	25	3.14
	23	685	709	24	3.50
		3,258	3,367	109	3.35
Firm	15	810	831	21	2.59
	18	840	868	28	3.33
	21	872	901	29	3.33
	24	900	920	20	2.22
		3,422	3,520	98	2.86

TABLE 23.—*Curing record of dry salt cured bellies (sides), Fort Worth.*

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Swept weight (pounds).	Gain from chilled weight through cure.	
					Pounds.	Per cent.
Oily	13	882	31	852	2	0.24
	16	728	30	663	−44	−6.22
	19	916	33	877	−8	−.90
	22	677	32	622	−28	−4.31
		3,203	.....	3,014	−78	−2.52
Soft	14	1,033	31	970	−30	−3.00
	17	805	30	740	−38	−4.88
	20	820	33	759	−36	−4.53
	23	709	32	654	−31	−4.53
		3,367	.....	3,123	−135	−4.14
Firm	15	831	31	768	−42	−5.19
	18	868	30	856	16	1.90
	21	901	33	833	−39	−4.47
	24	920	32	905	5	.56
		3,520	.....	3,362	−60	−1.75

DRY-SALT BELLIES.

Some of the bellies (side meat) were cured by the dry-salt method, because a large percentage of such meat is too large to be pickle cured and used for breakfast bacon, hence it was desirable to obtain data on the meat cured by the dry-salt process. The bellies from 300 hogs were divided into oily, soft, and firm and taken through cure, smoke, and retaining period together. This cut did not increase by pumping as much as the hams but the different grades did increase in about the same relative percentage. There was a noticeable difference between the swept weight of the dry-salt bellies and the cured weight of the pickled hams and bellies, which shows that meat pickle cured gains in weight, but meat cured in dry salt loses weight. In all lots except lots 13, 18, and 24, a loss in weight was recorded. It was also noted that the loss in the lots of soft meat was much greater and more uniform than in either the oily or firm.

From the chilled weight through the cure a loss was sustained as follows: Oily, 2.52 per cent; soft, 4.14 per cent; firm, 1.75 per cent.

TABLE 24.—*Soaking record of dry salt cured bellies (sides), Fort Worth.*

	Lot No.	Weight of meat in soak (pounds).	Time meat soaked.		Net weight of drained meat out of soak (pounds).	Temperature of water (° F.).	Gain in soak (pounds).
			Hours.	Minutes.			
Oily	13	852	2	35	850	75	−2
	16	663	1	.....	676	75	13
	19	877	2	45	874	76	−3
	22	622	1	.....	630	76	8
		3,014	.....	.....	3,030	.....	16
Soft	14	970	2	35	977	75	7
	17	740	1	.....	753	75	13
	20	759	2	45	768	76	9
	23	654	1	.....	659	76	5
		3,123	.....	.....	3,157	.....	34
Firm	15	768	2	35	780	75	12
	18	856	1	.....	859	75	3
	21	833	2	45	843	76	10
	24	905	1	.....	914	76	9
		3,362	.....	.....	3,396	.....	34

TABLE 25.—*Smoke record of dry salt cured bellies (sides), Fort Worth.*

	Lot No.	Weight in smoke (lbs.).	Hours smoked.	Temperature of smokehouse at—		Net weight of cooled meat (lbs.).	Total loss in smoke.		Total loss from chilled fresh weight through smoke.	
				Beginning (° F.).	Close (° F.).		Pounds.	Per cent.	Pounds.	Per cent.
Oily	13	850	24	90	128	785	65	7.65	65	7.65
	16	676	24	90	128	609	67	9.91	98	13.86
	19	874	19	82	132	816	58	6.64	69	7.80
	22	630	19	82	132	569	61	9.68	81	12.46
		3,030				2,779	251	8.28	313	10.12
Soft	14	977	24	90	128	897	80	8.19	103	10.30
	17	753	24	90	128	680	73	9.69	98	12.60
	20	768	19	82	132	695	73	9.51	100	12.58
	23	659	19	82	132	594	65	9.86	91	13.28
		3,157				2,866	291	9.22	392	12.03
Firm	15	780	24	90	128	711	69	8.85	99	12.22
	18	859	24	90	128	786	73	8.50	54	6.43
	21	843	19	82	132	766	77	9.13	106	12.16
	24	914	19	82	132	841	73	7.99	16	1.78
		3,396				3,104	292	8.60	275	8.04

TABLE 26.—*Retaining record of dry salt cured bellies (sides), Fort Worth.*

	Lot No.	Weight cooled smoked meat (lbs.).	Weight of meat 24 hours after smoked (lbs.).	Net weight of meat at end of—		Loss during retaining period.		Fresh chilled weight through retaining period.		
				6 days (lbs.).	19 days (lbs.).	Pounds.	Per cent.	Pounds loss.	Per cent loss.	Per cent yield.
Oily	13	785	781	764	734	51	6.50	116	13.65	86.35
	16	609	603	584	555	54	8.87	152	21.50	78.50
	19	816	812	795	770	46	5.64	115	12.99	87.01
	22	569	563	548	524	45	7.91	126	19.38	80.62
		2,779	2,759	2,691	2,583	196	7.05	509	16.46	83.54
Soft	14	897	893	869	831	66	7.36	169	16.90	83.10
	17	680	673	655	624	56	8.24	154	19.79	80.21
	20	695	692	671	644	51	7.34	151	18.99	81.01
	23	594	587	555	543	51	8.59	142	20.73	79.27
		2,866	2,845	2,750	2,642	224	7.82	616	18.91	81.09
Firm	15	711	705	689	658	53	7.45	152	18.77	81.23
	18	786	779	764	732	54	6.87	108	12.86	87.14
	21	766	759	738	708	58	7.57	164	18.81	81.19
	24	841	835	813	789	52	6.18	111	12.33	87.67
		3,104	3,078	3,004	2,887	217	6.99	535	15.63	84.37

The loss in smoke for the different kinds of meat was: Oily, 8.28 per cent; soft, 9.22 per cent; firm, 8.6 per cent. This shows that firm meat shrank 0.32 per cent and soft 0.94 per cent more than oily.

The percentage loss and resultant yield from chilled weight through the cure, smoke, and retaining period were as follows: Oily, 16.46 per cent; soft, 18.91 per cent; firm, 15.63 per cent. This shows that firm bellies cured by the dry-salt method and retained 19 days lost 0.83 per cent of the total weight less than oily and 2.45 per cent less than soft.

TABLE 27.—*Pumping record of dry-salt cured New Orleans shoulders, Fort Worth.*

	Lot No.	Chilled fresh weight (pounds).	Pumped weight (pounds).	Gain by pumping.	
				Pounds.	Per cent.
Oily	4	429	457	28	6.53
	7	358	383	25	6.98
	10	381	418	37	9.71
	13	576	614	38	6.60
	16	580	615	35	6.03
	19	530	560	30	5.66
	22	511	544	33	6.46
		3,365	3,591	226	6.72
Soft	5	391	420	29	7.42
	8	396	420	24	6.06
	11	419	453	34	8.11
	14	670	700	30	4.48
	17	621	655	34	5.48
	20	560	582	22	3.93
	23	580	604	24	4.14
		3,637	3,834	197	5.42
Firm	6	397	414	17	4.28
	9	379	394	15	3.96
	12	398	426	28	7.04
	15	595	616	21	3.53
	18	513	538	25	4.87
	21	615	642	27	4.39
	24	630	658	28	4.44
		3,527	3,688	161	4.56

TABLE 28.—*Curing record of dry salt cured New Orleans shoulders, Fort Worth.*

	Lot No.	Weight in cure (pounds).	Number of days in cure.	Swept weight (pounds).	Gain or loss from chilled weight through cure.	
					Pounds.	Per cent.
Oily	4	457	62	420	−9	−2.10
	7	383	61	356	−2	−.56
	10	418	60	360	−21	−5.51
	13	614	60	572	−4	−.69
	16	615	59	558	−22	−3.79
	19	560	62	525	−5	−.94
	22	544	61	502	−9	−1.76
		3,591	.....	3,293	−72	−2.14
Soft	5	420	62	380	−11	−2.81
	8	420	61	391	−5	−1.26
	11	453	60	405	−14	−3.34
	14	700	60	668	−2	−.30
	17	655	59	599	−22	−3.54
	20	582	62	548	−12	−2.14
	23	604	61	567	−13	−2.24
		3,834	.....	3,558	−79	−2.17
Firm	6	414	62	382	−15	−3.78
	9	394	61	382	+3	+.79
	12	426	60	389	−9	−2.26
	15	616	60	581	−14	−2.35
	18	538	59	533	+20	+3.90
	21	642	62	606	−9	−1.46
	24	658	61	650	+20	+3.17
		3,688	.....	3,523	−4	−.11

All of the oily and soft lots of New Orleans shoulders cured by dry-salt method lost in weight while being cured, but three lots of the seven classed as firm gained in weight.

There was a great variation, however, between lots of meat of the same kind, which was probably due to the amount of salt that remained on the meat after being swept, because this wide variation occurred with all three grades of meat.

Since these lots of shoulders were neither smoked nor retained a definite period of time, the results are not comparable with the other cuts.

The shrinkage through cure from chilled weight was: Oily, 2.14 per cent; soft, 2.17 per cent; firm, 0.11 per cent.

MELTING POINTS AND IODINE NUMBERS.

The samples of kidney fat used for the melting-point and iodine-number determinations were taken from hogs as nearly representative of the lots as possible. With some of the lots samples were selected from the softest and firmest hogs in order to determine the melting points and iodine numbers of both extremes in the same lot.

The average of the melting points for oily was 34.50 for East St. Louis tests and 34.90 for Fort Worth tests, for soft 40.28, and for firm 42.65 for East St. Louis and 44.16 for Fort Worth. The iodine numbers used as checks correspond inversely to the melting points.

TABLE 29.—*Melting points and iodine-number determinations made from fats taken from hogs out of test lots at East St. Louis and Fort Worth.*

EAST ST. LOUIS TESTS.

Lot No.	Melting point.		Iodine number.	
	Oily.	Firm.	Oily.	Firm.
	°F.	°F.		
1	32.70	44.00	85.00	59.15
2	39.80	41.50	72.85	62.95
3	[1] 26.50	[1] 43.10	[1] 81.74	[1] 71.08
	[2] 39.00	[2] 42.00	[2] 69.81	[2] 63.46
Average	34.50	42.65	77.35	64.16

FORT WORTH TESTS.

Lot No.	Melting point.			Iodine number.		
	Oily.	Soft.	Firm.	Oily.	Soft.	Firm.
	°F.	°F.	°F.			
4–5–6	27.20	32.10	42.10	84.28	75.40	66.00
7–8–9	32.00	37.00	46.50	75.90	75.39	58.13
10–11–12	[1] 30.50	[1] 40.60	[1] 40.40	[1] 86.56	[1] 73.62	[1] 67.78
	[2] 36.70	[2] 41.40	[2] 45.70	[2] 81.99	[2] 70.82	[2] 62.70
13–14–15	[1] 26.60	[1] 38.00	[1] 40.60	[1] 84.79	[1] 74.12	[1] 67.27
	[2] 30.00	[2] 42.00	[2] 45.70	[2] 81.23	[2] 63.97	[2] 61.43
16–17–18	[1] 36.00	[1] 36.10	[1] 45.00	[1] 77.93	[1] 75.90	[1] 59.40
	[2] 41.90	[2] 43.00	[2] 45.00	[2] 71.59	[2] 63.72	[2] 59.40
19–20–21	[1] 38.70	[1] 44.00	[1] 44.90	[1] 74.63	[1] 68.03	[1] 59.40
	[2] 38.10	[2] 44.00	[2] 43.40	[2] 74.12	[2] 62.45	[2] 61.43
22–23–24	[1] 38.70	[1] 40.40	[1] 45.50	[1] 74.63	[1] 70.57	[1] 58.13
	[2] 42.40	[2] 44.80	[2] 45.10	[2] 64.99	[2] 60.42	[2] 56.10
Average	34.90	40.28	44.16	77.72	69.54	61.43

[1] Softest carcasses of each lot. [2] Firmest carcasses of each lot.

The melting points of the lots follow consecutively across the page; i. e., lot 4 is oily, lot 5 soft, and lot 6 firm, etc.